

Work Order ID- 83694

83694

Page 1

May-30-12 7:58:33 AM

Item ID: D350-748-101

Accept

N900040100

Setup Start *NS1*

Revision ID: U/R

Stop *NS2*

Item Name: Crosstube Installation, High Fwd

Start Date: 4/23/12 Start Qty: 1.00

1

Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr
D350-748-141	F U/R OK 9/12/16/26

100	DOCUMENT CONTROL	0.00							
-----	------------------	------	--	--	--	--	--	--	--

100

DC

Document Control

Memo

Photocopy bluefile & type labels per PPPD350-748-101 CHG002

110	BENDING MACHINE - CROSSTUBES	0.00							
-----	------------------------------	------	--	--	--	--	--	--	--

110

CNC Bend 1

CNC Delta 100 Bender

Memo

Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT _____

120	QC15- Crosstube Dimensional Check	0.00							
-----	-----------------------------------	------	--	--	--	--	--	--	--

120

QC

Quality Control

Memo

Issue P/O to Metcor P/O: 16954 02/12/06/04 12-5-11
Rec'd + inspect for transit damage attach cab to

W/O:		83694 WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D350-48-101 PAR #: _____ Fault Category: X-tube NCR: ☒ Yes ☐ No DQA: [Signature] Date: 12/07/01
 Resolution: _____ Disposition: Rework QA: N/C Closed: [Signature] Date: 12/7/5

NCR: 12-1551		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
12-5-11	118	Tube bent High	CP 12-5-11 12-05-30	Stress relieve then trim to 23.4" high	MO 12-5-15	APL 12-5-15	CP 12-5-11 12-05-30	[Signature]

NOTE: Date & initial all entries

Work Order ID 83694

83694

Page 2

April-23-12 3:59:42 PM

Item ID: D350-748-101

Accept

N9000040100

Setup Start *NS1*

Revision ID: U/R

Stop *NS2*

Item Name: Crosstube Installation, High Fwd

Start Date: 23/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

125

0.00

125

HandFXtube

Hand Finishing Crosstubes

Memo

Stress relief

Heat treat crosstube as per QSI010 4.3

Temp: _____

Start time: _____

Finish time: _____

N/A sel
B.1

127

QC6- Inspect dimensions to drawing

0.00

127

QC

Quality Control

Memo

0.00

8/26/12

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

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Page 3

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Stop *NS2*

Item Name: Crosstube Installation, High Fwd

Start Date: 23/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

130

0.00

130

Crosstubes

Crosstubes

Memo

0.00

Crosstubes

1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B & C Drill Jigs,
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-141

4-Remove all marks from tube within limits of D350-748-141

5- Apply a light coat of LPS3 on the interior of tube

Batch: _____

140

QC5- Inspect part completeness to step on W/O

0.00

140

QC

Memo

0.00

Quality Control

CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)

Handwritten signature and initials

12-5-17

12-5-17

Handwritten signature and date

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Page 4

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Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

150

Outsource process-Cadplate per QSI017 4.1.9.1

0.00

150

Outsource3

Memo

0.00

Outsource process - Cad plate

Issue P/O: 17084

Stress relief at 375° for 5 hours

Magnetic Particle Inspect per ASTM E1444

Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2

Embrittle relief at 375° for 8 hours, Chromate Treat

Possible Supplier: Southwest United Industries

Ensure Certificate of Conformity is attached

CL 12/06/04

160

Receive & Inspect for Damage & Mat'l Certs

0.00

160

Packaging

Memo

0.00

Packaging

Ensure certificate of conformity is attached

1x 12/06/15
12-5-15

☆SRE W/O CHG ATTACHED

170

QC5- Inspect part completeness to step on W/O

0.00

170

QC

Memo

0.00

Quality Control

POSITIVE RECALL

EFFECTIVE 12-04-14 AUTH q

RELEASED q DATE 12/6/26

NDT

P/O: 17258

CL 12/06/19 K1

LOAD TEST

rec'd.

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Page 5

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Stop *NS2*

Item Name: Crosstube Installation, High Fwd

Start Date: 23/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

180

0.00

180

SprayPaint

SprayPaint

Memo

0.00

Spray Painting

1-Prime inside crosstube as per QSI 005 4.2

2-Prime Outside of Tube as per Dart QSI 005 4.2

B121746 - start: 12:30
Finish: 1:15
B121625 - start: 5:15
Finish: 5:45

12 - 6 - 21

190

0.00

190

QC14- Inspect Spray Paint

QC

Memo

0.00

Quality Control

Then, Wrap in plastic bag to protect from scratches

12 06 24

200

0.00

200

Crosstubes

Crosstubes

Memo

0.00

Crosstubes

1-Install Ground wire Insert, then insert screw and washer

2-Install Abraison strips as per Dwg D350-748-141 & QSI 035.

3-Install supports Using Dt8876 as per Dwg D350-748-141, Torque to 60-80 IN-LBS

12 06 24

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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83694

Page 6

* April-23-12 3:59:42 PM

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Stop *NS2*

Item Name: Crosstube Installation, High Fwd

Start Date: 23/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start *NR1*

QC:

Date:

SPC (Y/N):

Date:

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210	QC5- Inspect part completeness to step on W/O	0.00							
210									
QC	Memo	0.00							
Quality Control									
220	Pick Kit	0.00							
220									
Packaging	Memo	0.00							
Packaging									
230	QC4- 100% Inspect kits for completeness	0.00							
230									
QC	Memo	0.00							
Quality Control									

Q B 120625

120625

1 M 120625

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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NOTE: Date & initial all entries

Work Order ID 83694

83694

April-23-12 3:59:42 PM

Page 7

Item ID: D350-748-101

Accept

N900040100

Setup Start ***NS1***

Revision ID: U/R

Item Name: Crosstube Installation, High Fwd

Stop ***NS2***

Start Date: 23/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240		0.00							
240	Packaging								
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPP D350-748-101								
	Location: _____								
	PPP Rev: <u> C </u>								
250									
	QC21- Final Inspection - Work Order Release	0.00							
250									
QC	Memo	0.00							
Quality Control									

K *SP*
12-6-28

MW 12/06/26
MW 12/06/25

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Picklist Print

May-30-12 7:58:33 AM

Page 1

Work Order ID: 83694

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 06-07-05 JLM
 IPP Rev:B Update qty of MS21042L5 06-09-12 KJ VERIFY BY:DD
 IPP Rev:C Rev B 07-11-15 DD
 IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD
 IPP Rev:E 08-06-24 revD as per dwg DD verified by:EC IPP Rev:F 10.08.04 added QSI010
 4.3 DD verf:EC
 IPP REV:G ADD UNDER BEND COMMENT 12-05-28 JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
ALS4-1032-225 Insert		Purchased	No			200	Each	819.0000	1	1		12-06-24	

Location Loc Qty Loc Code

ST281 796
 108696 146
 110768 62
 118386 55
 118966 68
 121269 465
 ST282 23
 120410 10
 120451 13

118520

AN4-41A
 Bolt

Purchased No

220 Each 539.0000

8 8

50 12-6-25

Location Loc Qty Loc Code

360 181
 121185 181
 ST360 358
 115108 3
 115705 7
 118451 29
 118838 50
 119328 100
 120423 150
 121205 15
 121573 4

2x

Picklist Print

May-30-12 7:58:33 AM

Page 2

Work Order ID: 83694

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

AN4-6A Purchased No 220 Each 1,514.0000 16 16

Bolt

Location	Loc Qty	Loc Code
355	222	
121631	222	
ST356	1292	
119017	792	
121243	500	

AN5-32A Purchased No 220 Each 245.0000 4 4

Bolt

Location	Loc Qty	Loc Code
ST339	145	
119862	50	
120423	75	
120910	20	
ST340	100	
121541	100	

AN960JD10 NAS1149D0363J Purchased No 200 Each 0.0000 1 1

Washer

AN960JD416 NAS1149D0463J Purchased No 220 Each 30.0000 32

Washer

Location	Loc Qty	Loc Code
ST351	30	
116289	10	
119097	20	

AN960JD516 NAS1149D0563J Purchased No 220 Each 0.0000 8

Washer

May-30-12 7:58:33 AM

Shop Packet Print

Page 2

Picklist Print

May-30-12 7:58:33 AM

Page 3

Work Order ID: 83694

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

D2856-400

Manufactured No

200 f

242.5445

1.181

1.2431579

Abrasion Strip

Location

Loc Qty

Loc Code

ST403

216

81875

216

ST409

26.5445

63735

0.6696

68076

0.3149

71164

8.46

79551

17.1

D3500-1

Manufactured No

220 Each

75.0000

4

Saddle

Location

Loc Qty

Loc Code

ST423

14

78595

14

ST424

31

73405

20

73406

8

76000

3

ST425

30

76940

30

D3501-1

Manufactured No

220 Each

367.0000

16

16

Bushing

Location

Loc Qty

Loc Code

ST051

367

67757

4

73391

6

74866

207

77033

61

81955

26

83253

63

May-30-12 7:58:33 AM

Shop Packet Print

Page 3

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May-30-12 7:58:33 AM

Page 4

Work Order ID: 83694

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

D3502-1 Manufactured No 200 Each 21.0000 2 2 12 06 28
Support

77041

Location	Loc Qty	Loc Code
ST051	21	
73419	11	
74873	10	

D350-748-141TRN Manufactured No 110 Each 3.0000 1 1
Crosstube Turning Detail

Location	Loc Qty	Loc Code
LG	3	
74718	1	
83277	1	
83278	1	

~~74678~~

①

JW 12-5-10

MS21042L4 Purchased No 220 Each 4,059.0000 24 24 50
Nut

Location	Loc Qty	Loc Code
ST300	4059	
119075	125	
121011	677	
121444	2957	
121652	300	

24

MS21042L5 Purchased No 220 Each 1,447.0000 4 4 50 12-6-25
Nut

Location	Loc Qty	Loc Code
300	500	
121652	500	
ST300	947	
108827	8	
116105	5	
116548	43	
117611	18	
119109	865	
17651	8	

4

May-30-12 7:58:33 AM

Shop Packet Print

Page 4

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Parent Item Name: Crosstube Installation, High Fwd

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

MS21920-20 Purchased No

200 Each 86.0000 2 2

W/12 06 24

Clamp (per MIL-DTL-8783C)

Location	Loc Qty	Loc Code
LG050	86	
116799	8	
120676	8	
121067	20	
121274	50	

MS27039-1-10 Purchased No

200 Each 126.0000 1 1

W/12 06 24

Screw

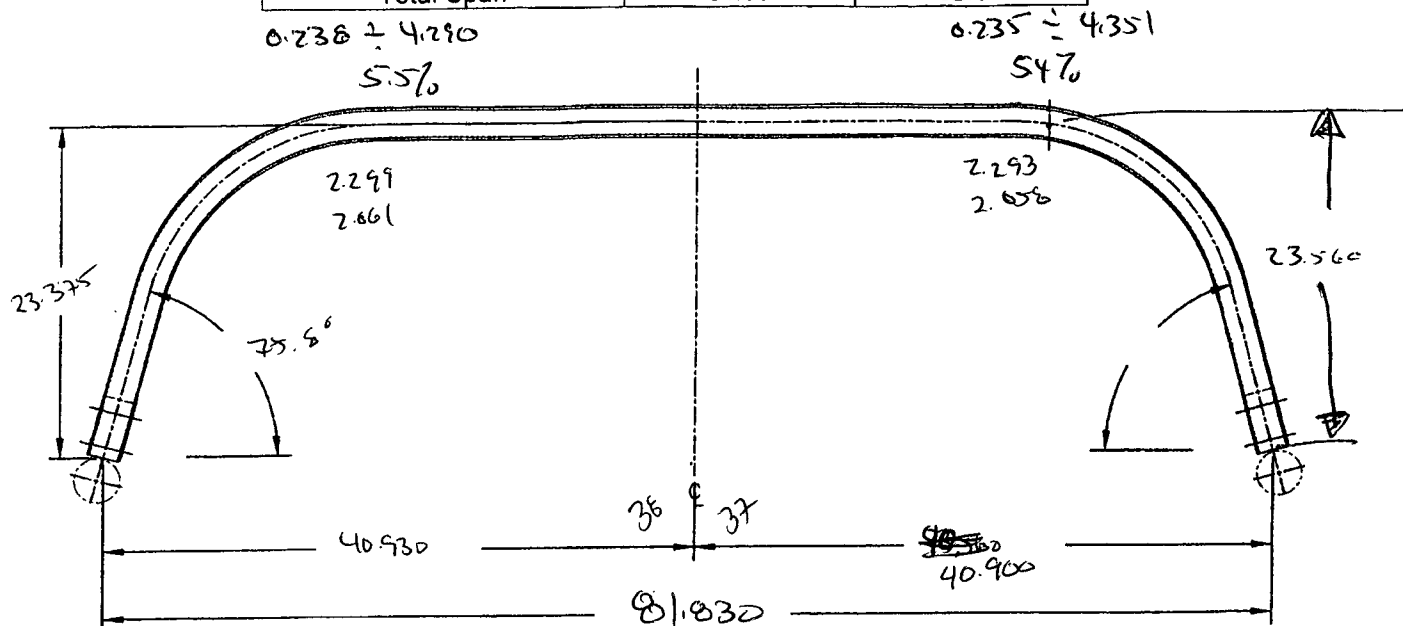
122027

Location	Loc Qty	Loc Code
GA	100	
120449	100	
ST291	26	
120120	26	

DART AEROSPACE LTD	Work Order:	83694
Description: Crosstube High Fwd (AS350/355)	Part Number:	D350-748-101
Inspection Dwg: D350-748-141	Rev: F	Page 1 of 1

Bend

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments
Side A = 5.5% crush @ 38 Passes
Side B = 5.4% crush @ 37 Passes
twist = 0.23"

TRIM TO 23.40 HIGH AFTER STRESS RELIEF 12.0511

QC15 Inspection	8
Date	12/05/10

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
FINISHED LENGTH = 110.270±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

CTC
WORK C
NO. 83694 MLCJ
12/04/24

UNDER REVIEW

11.07.12

RELEASED
2011-01-18

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG APPR.			
APPROVED			
DE APPR			
DATE	10.11.23		
DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA			
DRAWING NO. D350-748-141		REV. F SHEET 1 OF 4	
TITLE CROSSTUBE (AS 350/355 HI FWD)		SCALE N	
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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

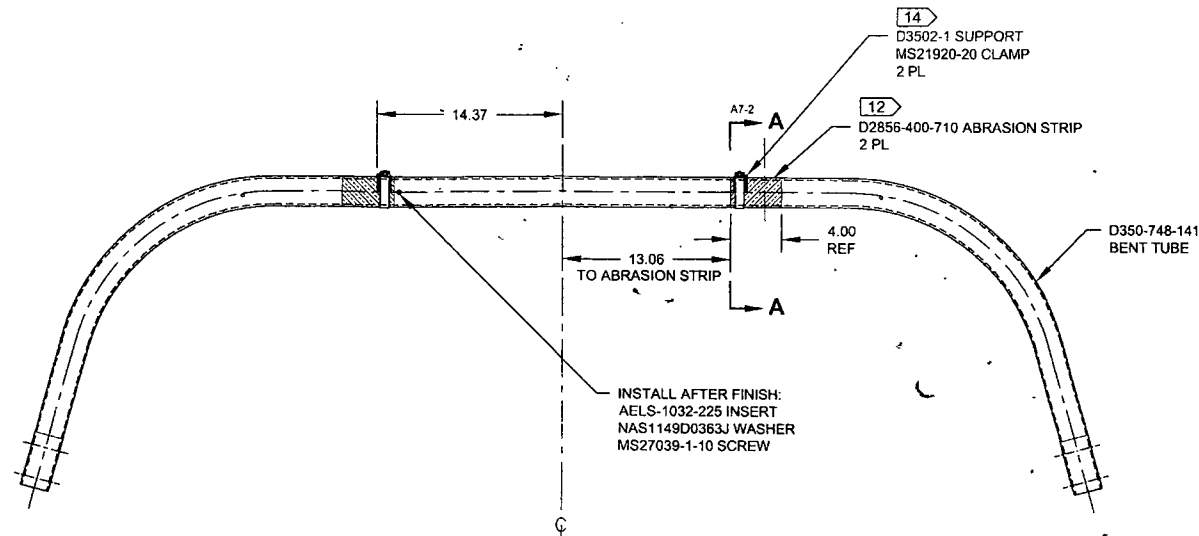
Part No: _____ PAR.#: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

83694

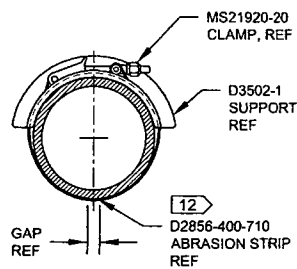


**D350-748-141
ASSEMBLY DETAIL**

UNDER REVIEW

11.07.11

RELEASED
2011-01-38



SECTION A-A D4-2
SCALE 4X

DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 2 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
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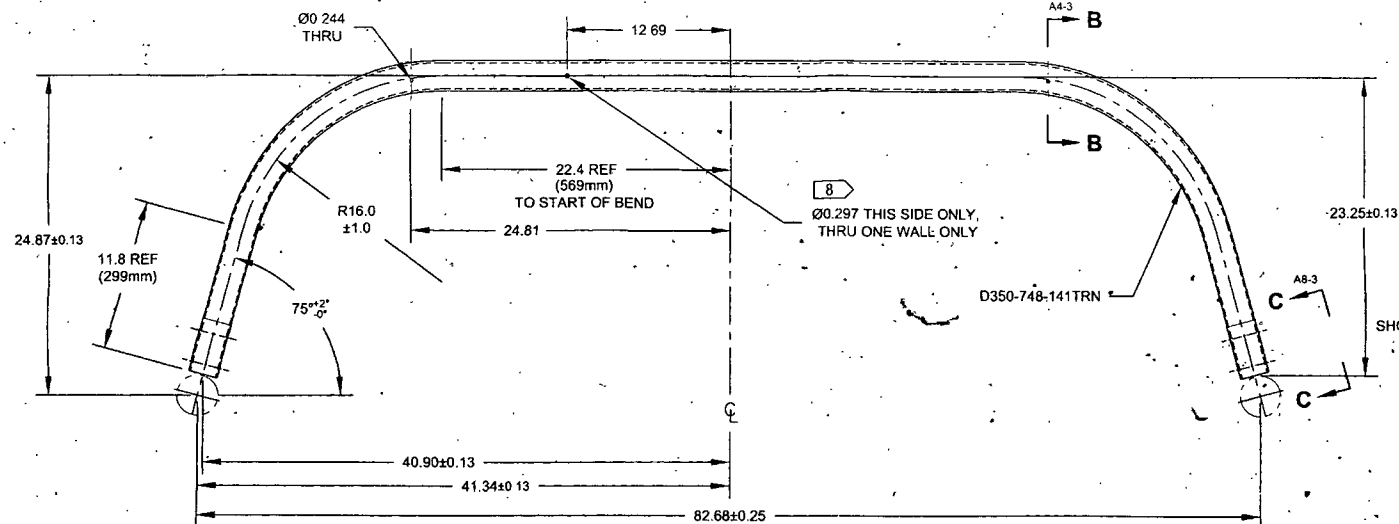
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

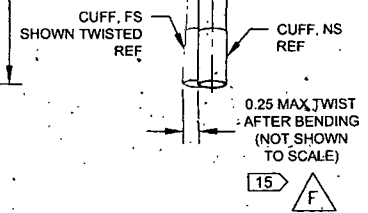
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NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

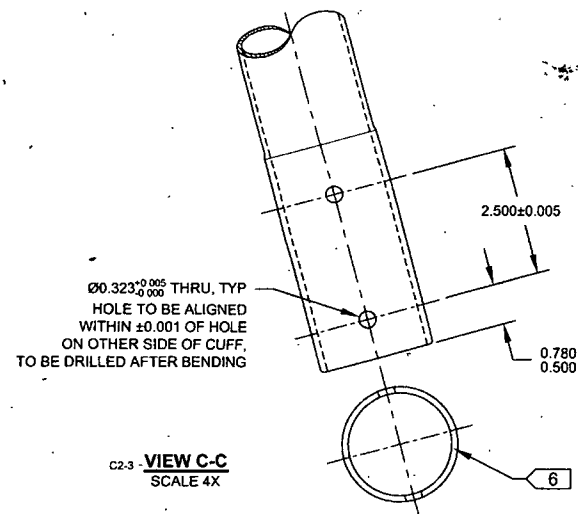
NOTE: Date & initial all entries



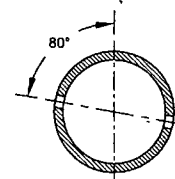
83694



D350-748-141
BENDING AND DRILLING DETAIL 10



C2-3 - **VIEW C-C**
SCALE 4X



SECTION B-B D3-3
SCALE 4X

UNDER REVIEW
11.27.12

RELEASED
2011-01-18

DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 3 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
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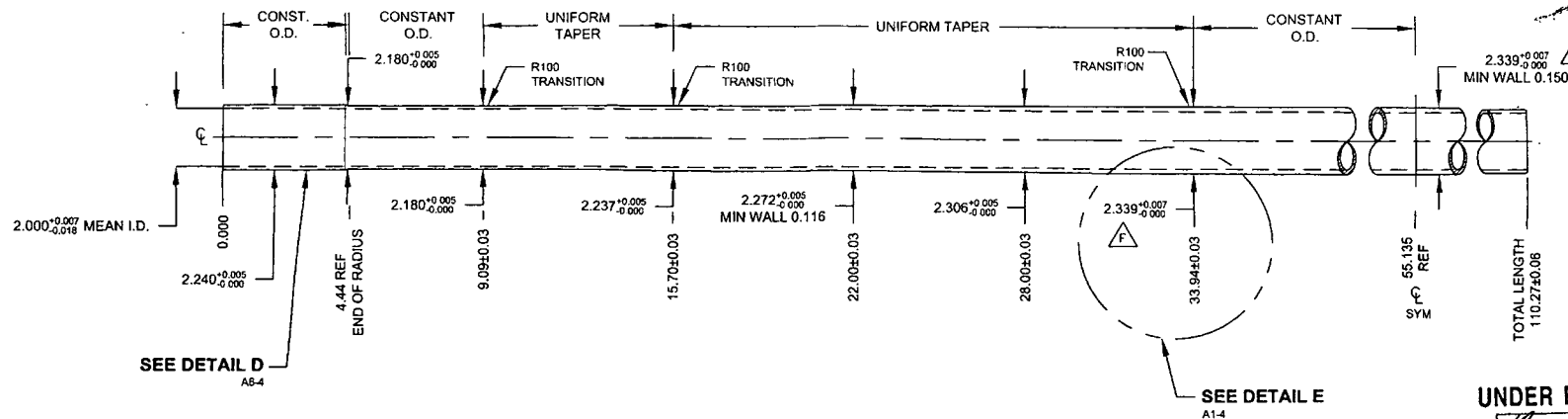
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DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

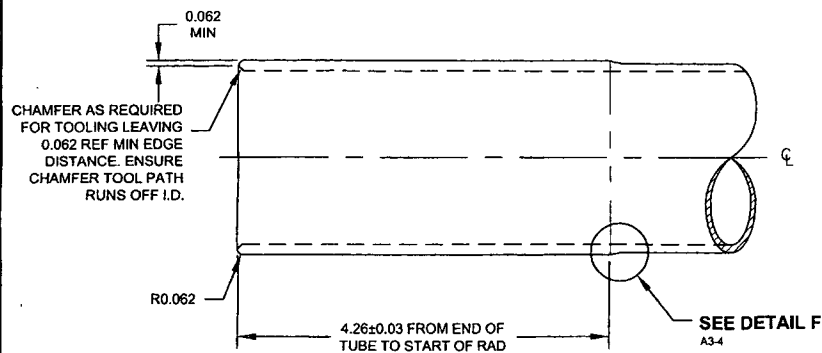
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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

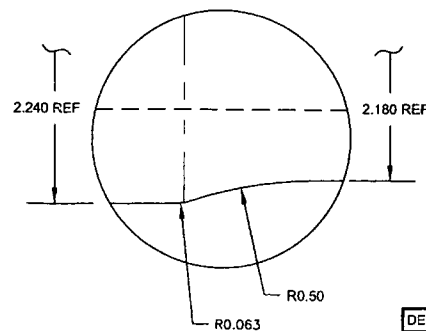


UNDER REVIEW
11.07.12

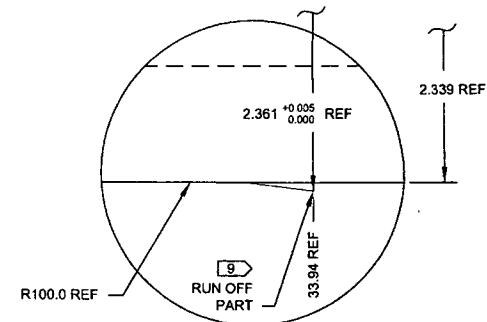
**D350-748-141TRN
TURNING DETAIL**



**DETAIL D:
CROSSTUBE CUFF** C7-4
SCALE 3X



**DETAIL F:
CUFF TRANSITION** A5-4
NOT TO SCALE



**DETAIL E:
TAPER RUN-OFF** C3-4
NOT TO SCALE

RELEASED
2011-01-18

DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 4 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11.10.05	161	LOAD TUBE TO 3500 ^{lb} FOR 1 MINUTE. REF D.S. EMAIL.		CP 12/6/18	1	CP 12/6/18	
11.10.05	162	NDT TUBE.					

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

DRAWING NO. D350-748-141	TITLE CROSSTUBE (AS 350/355 HI FWD)	REV. F	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D350-748-141-F-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>UP</i>	CHECKED <i>[Signature]</i>	MFG. APPR. <i>[Signature]</i>	APPROVED <i>[Signature]</i>		DE APPR. <i>[Signature]</i>		
DATE 12.04.02	DATE 12.04.03	DATE 12.04.03	DATE 12.04.03		DATE 12.04.03		

PURPOSE:

ADD A STRESS RELIEF OPERATION FOLLOWING BENDING

CHANGE:

ADD

10) AFTER BENDING: STRESS RELIEF AT 650°F ± 25°F FOR A MINIMUM OF 2 HRS.
AIR COOL TO AMBIENT TEMPERATURE
(REF. AMS2759/1E)

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Metcor Inc.

Metcor Inc.
560, boul. Arthur-Sauvé
St-Eustache (Québec) J7R 5A8
Tél.: 450-473-1884
Télécopieur: 450-473-5498
Tél. 450-473-6454

Certificat de Conformité **Certificate of Compliance**

BON DE TRAVAIL order	CHARGEMENT load
175926	1

CLIENT / customer 215
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY

ON K6A 1K7

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
16954		Steel		

SPÉCIFICATIONS DU PROCÉDÉ processing specifications

STRESS REL

SAE AMS 2750/1 REV.E

EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results
Visual

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
7	210	D350-748-101 (1) CROSS TUBE (1) D350-748-101 CROSS TUBE (1) D350-748-101 CROSS TUBE (1) D350-748-101 CROSS TUBE (1) D350-748-101 CROSS TUBE (1) D350-748-101 CROSS TUBE (1) D350-748-101 CROSS TUBE CONTENANT: 1 PALETTE

Melcor Inc.
560, boul. Arthur-Sauvé
St-Eustache (Québec) J7R 5A8

Certificat de Conformité
Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175926	1

 **Metcor Inc.**

CLIENT / customer 215
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY

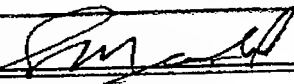
ON K8A 1K7

LIVRÉ À / shipped to:
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY

ON K8A 1K7

COMMENTAIRES / COMMENTS

INSPECTEUR / inspector:



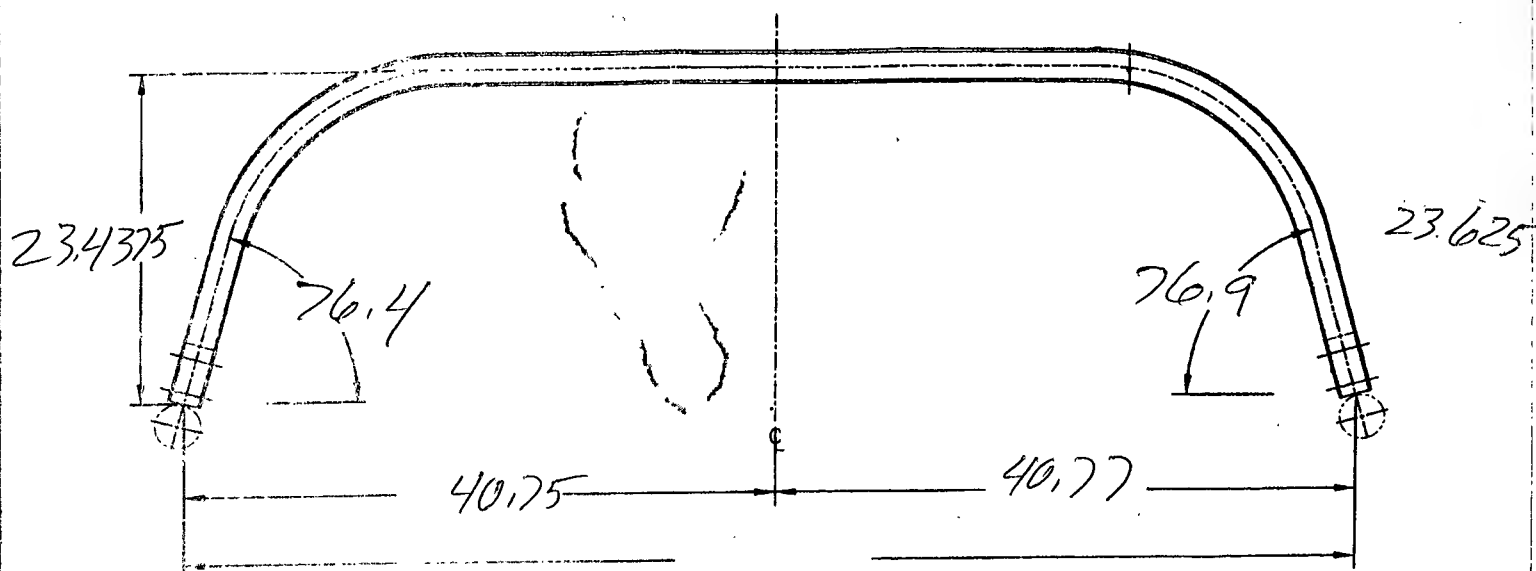


DATE: 2012-05-14

DART AEROSPACE LTD		Work Order: 83694
Description: Crosstube High Fwd (AS350/355)		Part Number: D350-748-101
Inspection Dwg: D350-748-141 Rev: F		Page 1 of 1

Stress

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



DP 12-5-14

Comments
TWIST 0.056"
Cut to 23.43 High. Acceptable CP 12.05.15 CPD 642

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	



**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: Jun-12-2012

CONSIGNED TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 114966

INVOICE #: 60875

**CONTRACT OR
PURCHASE ORDER #** PO17084

DESCRIPTION: CROSSTUBE

QTY 1

P/N # d350-748-101



S/N # 83694

STRESS RELIEVE HEAT CHART # 12-546. MPI-IAW ASTM-E-1444.
CADMIUM PLATE IAW AMS-QQP-416C TYPE 2 YELLOW CLASS.
BAKE HEAT CHART # 12-573. MPI IAW ASTM-E1444.

8/17/06/18

CERTIFICATE: I certify that the items indicated here on have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

Approved Inspector:



LIQUID PENETRANT TEST REPORT

P- 12187

ENT DART AERO SPACE DATE JUNE 19/2012 PAGE 1 OF 1
ENTION MATT / LINDA ACUREN JOB NO. 188-12-C0765 TIME AM ☒ PM ☐
ADDRESS 1270 ABERDEEN ST. PO/VO No. 17084
HANKS BURY, ON. WORK LOCATION JAME
ACCEPTANCE STD. ASTM 1417/01-038 REV./DATE 2005
PROJECT F.P.I. ON CROSS TUBES
ITEM(S) EXAMINED (6 PCS) SEE RESULTS

JOB DESCRIPTION PROCEDURE NO. LT-0002 REV./DATE 2008 TECHNIQUE No. LT-0002 REV./DATE 2008
PART NO. SEE RESULTS MATERIAL 4130 STEEL THICKNESS VARIOUS
SCOPE WET FLUORESCENT LIQUID PENETRANT
INSPECTION WAS DONE 100% ON THE EXTERNAL SURFACE ONLY

TEST DETAILS
METHOD ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED
DYE MAGNAFLUX BLACK LIGHT S/N 16459 ☒ OUTPUT > 1000 μ W/cm² ☐ AMBIENT < 2 fc
DEVELOPER SKD 52 MINIMUM DWELL TIME 45 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY
CAL DUE DATE JULY 28-2012

TEST SURFACE
SURFACE CONDITION ☐ AS GROUND ☐ AS WELDED ☒ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE METAL
SURFACE TEMPERATURE ☐ < -4°C/20°F ☐ -4°C/20°F TO 10°C/50°F ☒ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

RESULTS- ☒ METRIC ☐ IMPERIAL

W.O. CROSS TUBES			
1	"	83700	✓
1	"	83695	✓
1	"	83694	✓
1	"	84381	✓
1	"	81516	✓
1	"	83299	✓

Scope of Services
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES
CLIENT REPRESENTATIVE Matthew Murdoch DTR # E-63501
TECHNICIAN (SIGNATURE): Mike Johnson REPORT REVIEWED BY:
NAME (PRINT): Mike Johnson NAME INITIALS
CGSB LEVEL 1 SNT LEVEL 1 CGSB LEVEL 1 SNT LEVEL 1
CGSB REG. No. 0606 CGSB REG. No. 0606

WHITE - CLIENT COPY

CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

GOLD - OFFICE COPY

